

# **Exhibit 1**

## **Filed Under Seal**

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

**UNITED STATES DISTRICT COURT  
FOR THE NORTHERN DISTRICT OF CALIFORNIA**

CISCO SYSTEMS, INC., §  
§  
Plaintiff, §  
§  
v. § Case No. 14-CV-05344  
§  
ARISTA NETWORKS, INC., §  
§  
Defendant. §  
§

**REBUTTAL EXPERT REPORT ON FAIR USE OF  
JUDITH A. CHEVALIER**

**June 17, 2016**

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

## **I. INTRODUCTION**

### **A. Qualifications**

1. I am the William S. Beinecke Professor of Economics and Finance at the Yale University School of Management. I also hold a joint courtesy appointment at the Yale Department of Economics. I received my undergraduate degree in Economics from Yale University in 1989 and my Ph.D. in Economics from the Massachusetts Institute of Technology in 1993. I was an assistant professor in the Department of Economics at Harvard University from 1993 to 1994. I was a faculty member at the University of Chicago Graduate School of Business from 1994 to 2001, reaching the rank of full professor in 1999. I have been a faculty member at the Yale University School of Management since 2001. I am a Research Associate at the National Bureau of Economic Research. From 2007 to 2009, I was the Deputy Provost for Faculty Development at Yale University.

2. At Yale University, I teach courses in competitive strategy at the MBA level including previously teaching a course entitled “Technology Strategy.” This course helps students understand strategic issues that arise in high-technology industries. I also have taught a course entitled “Business, Public Policy and the Information Economy” at the undergraduate level. This course examines copyright, antitrust, and regulatory issues in telecommunications and broadcasting. At Yale University, I am also a former member and Chair of the University’s Committee on Cooperative Research, a committee that advises the provost on the University’s patenting and licensing policies.

3. My research interests include corporate finance and applied industrial organization, and I have published numerous articles in these areas in the American Economic Review; Journal of Political Economy; The Journal of Industrial Economics; The Journal of Law

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

and Economics; The Journal of Law, Economics, & Organization; Quarterly Journal of Economics; Journal of Marketing Research; and The Journal of Finance, among others. In 1999, I received the Elaine Bennett Research Prize, a prize for excellence in research by a woman economist given every two years by the Committee on the Status of Women in the Economics Profession of the American Economic Association.

4. I am a former co-editor of the American Economic Review, The Rand Journal of Economics, and The B.E. Journal of Economic Analysis and Policy. I have previously served as an associate editor of The Journal of Finance, The Quarterly Journal of Economics, the Journal of Economic Perspectives, and the RAND Journal of Economics, among others. I was a member of the Advisory Board of Quantitative Marketing and Economics and a former member of the Editorial Board of The Journal of Industrial Economics. I was an elected member of the Executive Committee of the American Economic Association and have served on the Nominating Committee and the Honors and Awards Committee of the American Economic Association. In 2006, I was elected to the American Academy of Arts and Sciences. I am also an elected fellow of the Econometric Society.

5. My curriculum vitae, which is attached as Exhibit 1, gives more biographical details and lists my writings. Exhibit 1 also lists the testimony that I have given in the past four years as an expert witness.

**B. Assignment**

6. I have been retained on behalf of Cisco Systems, Inc. (“Cisco”) to provide economic analysis and testimony, if necessary, related to Arista Networks, Inc. (“Arista”)’s alleged infringement of certain copyrighted elements of Cisco’s Internetwork Operating System (“IOS”, “IOS XR”, and “IOS XE”) and Nexus Operating System (“NX-OS”) software

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

(collectively, “Cisco IOS”), including its command-line interface (“Cisco CLI”). As part of that assignment, I have been asked to comment on the fair-use opinions offered by Arista’s expert witnesses related to “the effect of the use upon the potential market for or value of the copyrighted work” with respect to Arista’s infringement of Cisco’s copyrighted works, as set forth in the Expert Report and Disclosure of Cate M. Elsten (the “Elsten Report”)<sup>1</sup> and the Opening Expert Report of William M. Seifert (the “Seifert Report”),<sup>2</sup> both dated June 3, 2016.

**C. Summary of Conclusions**

7. The evidence that I have reviewed to date demonstrates that Arista’s copyright infringement has resulted in economic harm to Cisco and has reduced the value of Cisco’s copyrighted works related to its command-line interface (“CLI”) and associated technical documentation.

8. Cisco has invested in the copyrighted works at issue, which relate to specific creative expressions embodied in its proprietary Cisco CLI for networking equipment. Cisco also has invested in educating customers to enable them to effectively use Cisco CLI to maintain Cisco routers, switches, and other network products. This investment by Cisco has increased familiarity with Cisco CLI in the industry, and has reinforced its popularity among Cisco customers.

9. Arista employed a competitive strategy that included offering products that included a similar command-line interface and operational “look and feel” as Cisco’s products. I understand from Dr. Almeroth that Arista’s intentional alleged copying of specific multi-word

---

<sup>1</sup> Expert Report and Disclosure of Cate M. Elsten, June 3, 2016 (“Elsten Report”).

<sup>2</sup> Opening Expert Report of William M. Seifert, June 3, 2016 (“Seifert Report”).

HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY

**D. Arista’s Unauthorized Use of Cisco’s Copyrighted Works Enabled Arista’s Sales of Switches to Some Customers**

**1. Many Customers Value the Cisco CLI**

77. As described above, familiarity with Cisco CLI can reduce operational costs, save time and resources, and reduce costly errors in the management and operation of Cisco equipment.

78. Many network operators have become familiar with Cisco CLI through their participation in Cisco’s training and certification programs, which rely on the use of the CLI. Network engineers typically spend months preparing for Cisco certification exams. For example, one industry commentator estimated that, for an engineer who starts the certification process with minimal networking experience, achieving an associate-level CCNA certification would require approximately 250 hours of study, achieving a professional-level CCNP certification would require approximately an additional 450 hours of study, and achieving an expert-level CCIE certification would require approximately an additional 1,000 hours of study.<sup>173</sup> As described above, operation of Cisco equipment using Cisco CLI is a critical component of these certification exams, and achieving a Cisco certification requires a substantial degree of familiarity with Cisco CLI.

79. In addition, many network operators (regardless of whether they have Cisco certifications) at firms that purchase Cisco equipment are exposed to Cisco CLI throughout their career and gain familiarity with Cisco CLI through these experiences. As described above, this familiarity with Cisco CLI benefits organizations that deploy Cisco equipment in terms of

---

<sup>173</sup> See <http://blogs.cisco.com/perspectives/value-of-cisco-certifications-making-money-vs-study> (viewed 6/11/2016).

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

increased efficiency and accuracy. As such, the familiarity with Cisco CLI gained through on-the-job experience and Cisco certification and training programs reinforces the value of Cisco CLI to many customers of Cisco equipment.

80. As described by Arista’s Vice President of Customer Engineering, Anshul Sadana, [REDACTED]

[REDACTED]<sup>174</sup> Arista executives have stated that the vast majority of Arista’s customers indicate that “they appreciate the way they can leverage their deep IOS experience, as they can easily upgrade an existing [Cisco] Catalyst infrastructure to Arista.”<sup>175</sup> Arista’s Mr. Berly [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]<sup>176</sup>

## **2. Arista’s CLI Is Regarded as Being Very Similar to Cisco CLI, and Arista Emphasized This Similarity in its Marketing and Sales Efforts**

81. I understand that Cisco’s copyrighted works are important aspects of Cisco’s CLI.<sup>177</sup> I understand from Dr. Almeroth that “Arista copied a qualitatively significant portion of the works at issue,”<sup>178</sup> and, according to him, the interface, displays, command expressions, and help descriptions of Arista’s infringing CLI “are identical or very similar, which gives the user

---

<sup>174</sup> [REDACTED] See also, [https://eos.arista.com/linux-as-a-switch-operating-system-five-lessons-learned/#Lesson\\_5\\_Provide\\_familiar\\_interfaces\\_to\\_ease\\_adoption](https://eos.arista.com/linux-as-a-switch-operating-system-five-lessons-learned/#Lesson_5_Provide_familiar_interfaces_to_ease_adoption) (viewed 5/14/2016).

<sup>175</sup> [https://eos.arista.com/linux-as-a-switch-operating-system-five-lessons-learned/#Lesson\\_5\\_Provide\\_familiar\\_interfaces\\_to\\_ease\\_adoption](https://eos.arista.com/linux-as-a-switch-operating-system-five-lessons-learned/#Lesson_5_Provide_familiar_interfaces_to_ease_adoption) (viewed 5/14/2016).

<sup>176</sup> [REDACTED]

<sup>177</sup> Almeroth Rebuttal Report, at p. 77.

<sup>178</sup> Almeroth Rebuttal Report, at p. 68.

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

the entire ‘look and feel’ of Cisco’s CLI.”<sup>179</sup>

82. This similarity of Arista’s CLI to Cisco CLI [REDACTED]

[REDACTED] is recognized by third-party industry participants. [REDACTED]

[REDACTED].<sup>180</sup>

83. [REDACTED]

[REDACTED] Even after the introduction of its training program, Arista has waived its certification requirements for partners with certain Cisco certifications.<sup>184</sup>

---

<sup>179</sup> Almeroth Rebuttal Report, at p. 68.

<sup>180</sup>

[REDACTED] understand that Dr. Almeroth disagrees with this assertion. *See* Almeroth Rebuttal Report, at p. 26.

[REDACTED] By offering a CLI that is very similar to Cisco CLI, Arista has been able to free-ride off Cisco’s investments in training and certification programs.

<sup>184</sup> Arista typically requires its partners (e.g., resellers and systems integrators) to have Arista Certified Engineers on staff, but waives the requirement for Cisco-certified engineers. According to the study, Arista offers Arista Certified Engineer training on site at an estimated cost of \$2,500 per engineer. CSI-CLI-01386566-605, at 570; <https://www.arista.com/en/partner/partner-program> (viewed 5/21/2016).

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

84. Arista executives have made several public statements touting the similarity of its CLI to Cisco CLI in popular trade publications and whitepapers targeted for potential customers. For example, in an article published in Network World,<sup>185</sup> Arista’s CEO boasted, “a Cisco CCIE expert would be able to use Arista right away, because we have **similar command-line interfaces and operational look and feel.**”<sup>186</sup> In a public whitepaper describing the EOS software, Arista promoted that “[t]he familiar EOS command-line interface (CLI) avoids retraining costs.”<sup>187</sup> Similarly, [REDACTED]

[REDACTED] Arista’s “[f]amiliar management interfaces” and “standard CLI” enabled “customers to be able to rapidly adopt [Arista] products and integrate them into their environments.”<sup>189</sup> Mr. Duda emphasized, “our switches provide a familiar management interface so their existing tools and processes, screen scraping, automation, continue to work just as they did before.”<sup>190</sup>

85. [REDACTED]

[REDACTED]

[REDACTED]

---

<sup>185</sup> Network World is a popular blog for network and IT professionals. *See, e.g.*, Berly Deposition, at p. 84.

<sup>186</sup> [http://www.arista.com/assets/data/pdf/Network\\_World\\_Arista\\_SDN.pdf](http://www.arista.com/assets/data/pdf/Network_World_Arista_SDN.pdf) (viewed 5/14/2016) (emphasis added).

<sup>187</sup> <http://www.101datasolutions.co.uk/wp-content/uploads/2009/02/eos-architecture-whitepaper.pdf> (viewed 5/14/2016).

<sup>188</sup> [REDACTED]

<sup>189</sup> <http://blogs.cisco.com/news/protecting-innovation> (viewed 5/14/2016); <https://eos.arista.com/video-library/>, at “EOS Bits & Bytes – Episode 1” at 7:15 to 8:00 (viewed 5/16/2016).

<sup>190</sup> <http://blogs.cisco.com/news/protecting-innovation> (viewed 5/14/2016); <https://eos.arista.com/video-library/>, at “EOS Bits & Bytes – Episode 1” at 7:15 to 8:00 (viewed 5/16/2016).

<sup>191</sup> I understand from Dr. Almeroth that Arista’s use of the term “industry standard” is effectively a codename that Arista has used to refer to Cisco’s CLI and that there has been no standard CLI adopted by the switch industry. Almeroth Report, at 29, 139.

HIGHLY CONFIDENTIAL – ATTORNEYS' EYES ONLY

A page with numerous horizontal black redaction bars of varying lengths. A large central redaction box is present, with a small black square to its left. A vertical line and a small square are at the bottom left. A small white rectangular box is at the bottom center.

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

---

[REDACTED]  
[REDACTED]  
[REDACTED]

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] »203

87. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED]

[REDACTED]

[REDACTED] 205

88. Several third parties have made note of this strong perceived resemblance. For example, an article published in CRN in 2014 noted, “[Arista] created a CLI [command-line interface] that **looks and acts very much like Cisco’s**...there are a lot of folks out there that are proficient with the Cisco command-line and user interface. Arista is a real natural fit for them.”<sup>206</sup> Another third-party reviewer commented on the perceived similarity between the two CLIs, noting, “Arista provides a CISCO like CLI, when I say ‘CISCO like’ I mean it’s **95% the same**

---

202 [REDACTED]

203 [REDACTED]

204 [REDACTED]

205 [REDACTED]

206 <http://www.crn.com/print/news/networking/300073307/arista-partners-our-business-is-booming-as-competition-with-cisco-heats-up.htm?page=0%2C1> (viewed 5/18/2016) (emphasis added).

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY****commands...<sup>207</sup>**

89. Similarly, *Arista Warrior*, a manual detailing Arista’s products, describes that the overlap between Cisco CLI and Arista’s CLI is so extensive that “much of the configuration can be **cut and pasted** from a Cisco IOS switch into EOS” because the commands are identical.<sup>208</sup> In fact, the author notes that Arista’s CLI is an even closer substitute for Cisco CLI than Cisco’s own NX-OS CLI: “[i]f you’ve ever had to learn NX-OS after spending years on IOS, I can all but guarantee that migrating to EOS will be easier.”<sup>209</sup> Consistent with this, many network customers perceive other vendors’ CLIs to be less similar to Cisco CLI as compared to Arista CLI.<sup>210</sup>

### **3. Cisco’s Copyrighted Material Directly Contributed to Sales of Arista Products**

90. As described above, many Cisco customers value Cisco CLI, in part because of their familiarity with its distinctive “look and feel.” I understand that Arista has copied a “qualitatively significant portion” of Cisco’s copyrighted works, including its CLI, which has resulted in a CLI with the “look and feel” of Cisco’s CLI.<sup>211</sup>

---

<sup>207</sup> <https://cybermashup.com/2014/01/20/first-steps-with-arista-networks/> (viewed 5/27/2016) (emphasis added).

<sup>208</sup> Donahue, Gary. *Arista Warrior*. Sebastopol, CA: O’Reilly Media, Inc., 2013, at p. 381 (emphasis added).

<sup>209</sup> Donahue, Gary. *Arista Warrior*. Sebastopol, CA: O’Reilly Media, Inc., 2013, at p. 59.

<sup>210</sup> See, e.g., <https://www.forwardingplane.net/2012/10/juniper-to-ios-conversion-chart/> (viewed 5/16/2016) (describing that “moving to Junos OS from IOS can be a daunting task”); CSI-CLI-01386566-605, at 575 (describing that while Arista is “very Cisco like,” “Juniper is not and that’s a tough thing.”); <https://blog.packetsource.net/2014/02/15/cutting-junos-some-slack/> (viewed 5/16/2016); <http://www.infoworld.com/article/2679995/networking/dell-switches-make-waves.html> (viewed 5/28/2016) (describing Dell’s PowerConnect CLI, “[t]he similarity to IOS will shorten the learning curve for many Cisco-versed network administrators, but there are enough differences to cause some frustration in a mixed environment.”); <http://www.shanekillen.com/2011/08/ciscobrocade-cli-comparison.html> (viewed 5/27/2016) (noting that “Brocade will tell you to your face that the CLI is just the same as Cisco...[it’s] simply not true.”). [REDACTED]

[REDACTED] Similarly, several competitors provide reference guides that compare and contrast their CLI to Cisco CLI. See, e.g., [http://h17007.www1.hp.com/docs/interoperability/Cisco/HP-Networking-and-Cisco-CLI-Reference-Guide\\_June\\_10\\_WW\\_Eng\\_ltr.pdf](http://h17007.www1.hp.com/docs/interoperability/Cisco/HP-Networking-and-Cisco-CLI-Reference-Guide_June_10_WW_Eng_ltr.pdf) (viewed 5/18/2016).

<sup>211</sup> Almeroth Rebutta Report, at p. 68.

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

91. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED]

[REDACTED]

92. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED]

[REDACTED]

[REDACTED]

---

212 [REDACTED]

213 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY

93.

217

94. This testimony suggests that, for some customers, it was necessary for Arista to first “check off” its CLI before the customer would consider its other differentiating features, including low latency, programmability, high density, reliability, other aspects of its EOS

216

217

<sup>219</sup> See, e.g., CSI-CLI-01386566-605, at 571; Arista Q4 2015 Highlights, February 2016, at pp. 8, 10.

220 [REDACTED] Cisco's Mr. Palumbo stated that the CLI "would have been one of the first things a customer would have evaluated: 'Hey, can I even operate the switch?'" Deposition of Frank Palumbo, June 7, 2016 ("Palumbo Deposition"), at p. 22. See also, Palumbo Deposition, at p. 26.

221 [REDACTED] Cisco's Mr. Palumbo stated, "to even get to the discussion, it wouldn't have happened unless [Arista] had Cisco's CLI." Palumbo Deposition, at p. 26.

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

software, and customer support, among other things.<sup>222</sup> That is, though factors such as high performance and low latency may ultimately have been important for the customer’s decision, Arista’s unauthorized use of Cisco’s copyrighted works enabled Arista’s products to reach the next stage of the decision-making process. But for the use of Cisco’s copyrighted material related to Cisco CLI, Arista’s product would likely never have been seriously considered by many of these customers, regardless of its other features.

95. Together, this evidence suggests that Arista’s infringement of Cisco’s copyrighted material related to its CLI enabled sales of Arista products to some customers. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Put another way, for some customers, other features of Arista’s product would have been rendered irrelevant to the decision-making process but for Arista’s use of Cisco’s copyrighted material. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

---

<sup>222</sup> See, e.g., CSI-CLI-01386566-605, at 571; Arista Q4 2015 Highlights, February 2016, at pp. 8, 10.

<sup>223</sup> [REDACTED]

<sup>224</sup> [REDACTED]

**HIGHLY CONFIDENTIAL – ATTORNEYS’ EYES ONLY**

225

**E. Arista’s Use of Cisco’s Copyrighted Works Has Harmed Cisco by Causing Cisco to Lose Commercial Opportunities in High-Speed Switching**

96. Above, I described how some of Arista’s customers would not have purchased Arista switches but for Arista’s infringement of Cisco’s copyrighted works. Because those are exactly the customers for whom the similarity of Arista’s CLI to Cisco CLI, including the “look and feel,” was necessary to their decision to purchase Arista switches, many—if not most—of this subset of customers likely would have purchased switches from Cisco but for Arista’s infringement.

97. Even assuming that the customers who purchased Arista switches because of Arista’s use of the copyrighted works related to Cisco CLI were like the average customer (and not those who strongly preferred Cisco CLI), Cisco’s position as the leading vendor of high-speed data center switches suggests that a large share of those customers, [REDACTED]

[REDACTED] would have purchased Cisco switches in place of Arista switches.<sup>226</sup>

98. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

---

225 [REDACTED]

226 [REDACTED]

227 [REDACTED]

228 [REDACTED]

**EXHIBIT 1**

**Curriculum Vitae**  
Judith A. Chevalier

**Home:**

236 Edwards St.  
New Haven, CT 06511  
(203) 787-6518

**Email:** judith.chevalier@yale.edu

**Office:**

School of Management  
Yale University  
135 Prospect Street  
New Haven, CT 06520  
(203) 432-3122

**Primary Positions:**

September 2007-June 2009, Deputy Provost for Faculty Development, Yale University.

February 2005-present, William S. Beinecke Professor of Economics and Finance, Yale School of Management.

June 2001- February 2005, Yale University School of Management, Professor of Finance and Economics.

July 1999-May 2001, University of Chicago, Graduate School of Business, Professor of Economics.

July 1997-June 1999, University of Chicago, Graduate School of Business, Associate Professor of Economics.

July 1994-June 1997, University of Chicago, Graduate School of Business, Assistant Professor of Economics.

July 1993 - June 1994, Harvard University, Department of Economics, Assistant Professor of Economics.

**Education:**

May, 1993, Ph.D., Economics, Massachusetts Institute of Technology.

May, 1989, B.A., *summa cum laude*, Yale University, Distinction in the Major, Economics.

**Other Positions:**

Organizing Committee, Econometric Society Winter Meetings, 2014-2015.

Provost's Review Committee, Columbia Business School, 2013.

Presidential Search Committee, Yale University, 2012.

Honors and Awards Committee, American Economic Association, 2012- .

Co-editor, *Rand Journal of Economics*, May 2009-March 2013.

Prize committee, Fisher Black Prize, American Finance Association, 2008.

**EXHIBIT 1**

National Science Foundation, Economics Review Panel, 2007-2009.

Editorial Board, *Journal of Industrial Economics*, 2006-2011.

Nominating Committee, American Economic Association, 2007-2008.

Nominating Committee, American Academy of Arts and Sciences, 2006, 2009, 2010.

Co-Editor, *American Economic Review*, November 2004-June 2007.

Yale University Budget Committee, Co-chair, 2012-

Steering Committee, Committee on Yale College Education, 2010- .

Advisory Board, *Journal of Economic Perspectives*, 2009-2012.

Chair, Faculty Section and Steering Committee, Committee on Yale Reaccreditation, 2008-2010.

Search Committee, American Economics Association committee for the editor of the AEA *Journal of Microeconomics*, Fall 2006.

Executive Committee, American Economic Association, January 2005- January 2008. Member of the finance committee, audit committee, and ad hoc committee on journals.

Visiting Committee, MIT Economics Department, February 2005, February 2007, March 2011.

Member, Dean Search Committee, Yale School of Management, 2004- 2005, 2009-2010.

Chair, Yale University Committee on Cooperative Research, 2003-2006. Member, 2002-2003.

Member, Provost's Committee on Sexual Misconduct, 2009-2010

Member, Council of the Women's Faculty Forum, Yale University, 2003-2009.

Member, Board of the Chief Executive Leadership Institute, 2005-present.

January 2002-December 2004. Board member, Committee on the Status of Women in the Economics Profession (CSWEP), American Economic Association.

January 2002-present. Fellow, Davenport College, Yale University. Member, Summer 2005, search committee for Davenport College Dean.

February 2003- October 2004. Editor, The B.E. Journals in Economic Analysis and Policy.

AEA Search Committee for Editor of the *Journal of Economic Literature*, 2003.

**EXHIBIT 1**

January 2002-2009. Advisory Board, *Quantitative Marketing and Economics*.

January 2001-July 2002. Associate Editor, *American Economic Review*.

March 2000-September 2004. Associate Editor, *The Journal of Finance*.

American Finance Association nominating committee, 1999.

July 1999 – July 2002, Associate Editor, *Review of Financial Studies*.

January 1999 – December 2003, Associate Editor, *Quarterly Journal of Economics*.

January 1999 – December 2003, Associate Editor, *Journal of Economic Perspectives*.

July 1997-October 2004, Associate Editor, *Journal of Industrial Economics*.

January 1996-October 2004, Associate Editor, *Rand Journal of Economics*.

September 1999-present, Research Associate, National Bureau of Economic Research.

September 1993-September 1999, Faculty Research Fellow, National Bureau of Economic Research.

Consortium Faculty, Cardean University, Unext.com, 1999-2001. Consulted on design of web-based strategy course.

**Research Interests:**

Time use. Competition in high technology industries and telecommunications. Competition and regulation in retail industries; implications of retail pricing behavior for macroeconomics. Competition on the Internet and for information goods. The problems facing durable goods manufacturers. The interaction between firm capital structure and product market competition. The impact of liquidity constraints on markup, inventory, and capital expenditure cyclicalities. Testing models of agency and career concerns. The impact of “noise traders” on financial markets. Cross-subsidization of activities within conglomerate firms.

**Honors and Awards:**

Elected Fellow, Econometric Society, 2013.

National Science Foundation research grant for 2011-2014, SBR 1128322, “Strategic Shoppers.”

William F. O’Dell Award, *Journal of Marketing Research*, 2011. For paper published in the *Journal of Marketing Research*, August 2006.

Elected member, American Academy of Arts and Sciences, 2006-present.

Nominated paper, Smith Breeden prize, *Journal of Finance*, 1999. For paper published in the *Journal of Finance*, June 1999.

**EXHIBIT 1**

Recipient, first annual Elaine Bennett Research Prize. This prize is intended to recognize research by a young woman in any area of economics. The prize is administered by the American Economic Association Committee on the Status of Women in the Economics Profession. Presented January 1999.

Alfred P. Sloan Foundation, Sloan Research Fellow, Awarded for 1997-1998, and 1998-1999 academic years.

Smith Breeden “Distinguished Paper” prize, *Journal of Finance*, 1995. Prize awarded for paper published in the *Journal of Finance*, September 1995.

National Science Foundation research grant SBR 94-14141 for 1994-1996.

Review of Economic Studies tour (one of seven doctoral students presenting work at conferences in Europe and Israel), Summer, 1993.

National Science Foundation Graduate Fellowship, 1989-1992.

Dickerman Prize, Yale University, for Best Senior Thesis in Economics, 1989.

**Publications:**

With Chris Avery and Richard Zeckhauser, “The CAPS Prediction System and Stock Market Returns”, *Review of Finance*, 2015.

With Dina Mayzlin and Yaniv Dover, “Promotional Reviews: An Empirical Investigation of Online Review Manipulation”, *American Economic Review*, 2014.

With Jonathan Baker, “The Competitive Consequences of Most Favored Nations Provisions”, *Antitrust Magazine*, Spring 2013.

With Keith Chen, “Are Women Overinvesting in Education? Evidence from the medical profession,” *Journal of Human Capital*, Summer 2012.

With Austan Goolsbee, “Are Durable Goods Consumers Forward Looking? Evidence from the College Textbook Market”, *Quarterly Journal of Economics* vol 124, November 2009.

With Keith Chen, “The Taste for Leisure, Career Choice, and the Returns to Education”, *Economics Letters* Vol. 99, May 2008, 353-356.

With Fiona Scott Morton, “State Casket Seller Restrictions: A Pointless Undertaking?”, *Journal of Law and Economics*, August 2008.

With Dina Mayzlin, “The Effect of Word of Mouth on Sales: Online Book Reviews”, *Journal of Marketing Research*, August 2006.

“What Do We Know About Cross-subsidization? Evidence from Merging Firms.”, *Advances in Economic Analysis & Policy* 2004: Vol. 4: No. 1, Article 3.  
<http://www.bepress.com/bejap/advances/vol4/iss1/art3>

**EXHIBIT 1**

with Austan Goolsbee, “Valuing Internet Retailers: Amazon and Barnes and Noble”, *Advances in Applied Microeconomics* 12: Organizing the New Industrial Economy, 2003.

with Austan Goolsbee, “Measuring prices and price competition online: Amazon vs. Barnes and Noble,” *Quantitative Marketing and Economics* I (2), June 2003.

with Anil Kashyap and Peter Rossi, “Why don’t price rise during periods of peak demand? Evidence from scanner data,” *American Economic Review*, March 2003.

with Dennis Carlton, "Free riding and sales strategies on the internet," *Journal of Industrial Economics*, December 2001.

with Chris Avery, “Identifying Investor Sentiment from Price Paths: The Case of Football Betting,” *Journal of Business*, October 1999.

with Glenn Ellison, “Are Some Mutual Fund Managers Better than Others? Cross-sectional Patterns in Behavior and Performance”, *Journal of Finance*, June 1999.

with Chris Avery, “Herding over the Career,” *Economics Letters*, June 1999.

with Glenn Ellison, “Career Concerns of Mutual Fund Managers,” *Quarterly Journal of Economics*, May 1999.

with Chris Avery and Scott Schaefer, “Why Do Managers Undertake Acquisitions?: an Analysis of Internal and External Rewards to Acquisitiveness”, *Journal of Law, Economics, and Organization*, April 1998.

with Glenn Ellison, “Risk Taking by Mutual Funds as a Response to Incentives,” *Journal of Political Economy*, December 1997. Reprinted in P.L. Joskow and M. Waterson, eds., *Empirical Industrial Organization*, Edward Elgar, 2004.

with David S. Scharfstein, “Capital Market Imperfections and Countercyclical Markups: Theory and Evidence,” *American Economic Review*, September 1996.

“Do LBO Supermarkets Charge More? An Empirical Analysis of the Effects of LBOs on Supermarket Pricing,” *Journal of Finance*, September 1995.

“Capital Structure and Product Market Competition: Empirical Evidence from the Supermarket Industry,” *American Economic Review*, June 1995. Reprinted in P.L. Joskow and M. Waterson, eds., *Empirical Industrial Organization*, Edward Elgar, 2004.

with David S. Scharfstein, “Liquidity Constraints and the Cyclical Behavior of Markups,” *American Economic Review Papers and Proceedings*, May 1995.

**Working Papers/Work in Progress:**

With Dina Mayzlin and Yaniv Dover, “Channels of Impact: User Reviews when Quality is Dynamic and Managers Respond”, September 2015, submitted.

**EXHIBIT 1**

With Anil Kashyap, “Best Prices: Implications for Price Measurement”, September 2015, Prior version: NBER Working Paper 16680, Revision requested, *American Economic Journals: Policy*.

With Veronica Guerrieri and Anil Kashyap, “Consumer Search and Monetary Policy Non-Neutrality”, work in progress.

With Fiona Scott Morton and David Harrington, “Regulating Direct Cremations: The Cost of Seemingly Small Regulatory Changes”, January 2011.

With Fiona Scott Morton and David Harrington, “Differentiated to Death? Examining the Roles of Proximity and Preference in the Patronage of Co-Ethnic Businesses”, Yale School of Management working paper, February 2013.

**Popular Publications/ Teaching Cases:**

With Dina Mayzlin and Yaniv Dover, “Who Gave that Hotel Five Stars? The Concierge”, *Harvard Business Review*, September 2012.

With Keith Chen, “Is Medical School a Worthwhile Investment for Women?”, the Atlantic Online Edition, July 23 2012.

With Jaan Elias, “Potash Corporation of Saskatchewan”, Yale Case 11-031, October 2011.

*New York Times*, “A Carbon Cap that Starts in Washington”, 12/16/07.

*New York Times*, “In Search of Wireless Wiggle Room”, 10/21/07.

*New York Times*, “Welcome Stranger, Here’s a Speeding Ticket”, 9/2/07.

*Slate*, “Oversell” 12/12/06.

*Financial Times*, . “The Pros and Cons of Entering a Market,” *Financial Times Mastering Strategy Series*, November 1, 1999. Reprinted in Mastering Strategy, Prentice Hall, 2000

*Financial Times*, “When it Can be Good to Burn your Boats,” *Financial Times Mastering Strategy Series*, October 25, 1999. Reprinted in Mastering Strategy, Prentice Hall, 2000

**Teaching:** “Competitor”, Core class, Yale School of Management, Fall 2011, Fall 2012.

“Technology Strategy”, Yale School of Management, Fall 2009.

“Business, Public Policy, and the Information Economy”, Yale School of Management, Spring 2012, Fall 2010, Spring 2007, Spring 2006, Spring 2005.

Undergraduate “Business, Public Policy, and the Information Economy”, Yale University, Spring 2013, Spring 2012, Spring 2010, Spring 2008, Spring 2007, Spring 2006, Spring 2005, Spring 2004.

**EXHIBIT 1**

PhD. level Industrial Organization, Yale Economics Department, Spring 2003.

Competitive Strategy, Yale School of Management. 2002-2011.

Competitive Strategy, Graduate School of Business, University of Chicago. Two sections, Winter 2001. Three sections, Winter 2000. Two sections, Autumn 1996; three sections, Autumn 1997; three sections, Autumn 1998.

Competitive Strategy, Executive MBA Program (XP), University of Chicago. One section, Winter 2001.

PhD. Industrial Organization, Graduate School of Business, University of Chicago. Co-taught with Dennis Carlton and Josef Perktold, Autumn 1996 and Winter 1997.

Economics of the Firm, Graduate School of Business, University of Chicago, Executive MBA course. Taught in domestic executive program in Autumn 1995, taught in international executive program in Barcelona, July-August 1996.

Microeconomics, Graduate School of Business, University of Chicago, MBA course. Seven sections, 1994-1995. One section, Autumn 1999.

Industrial Organization, Department of Economics, Harvard University, Ph.D. course, Spring, 1994. Co-taught with Glenn Ellison.

Corporate Finance, Department of Economics, Harvard University, Ph.D. course, Spring, 1994. Co-taught with Andrei Shleifer.

Corporate Control and Governance, Department of Economics, Harvard University, Undergraduate Course, Spring, 1994.

Strategy teaching for the Business Advisor program for RSM McGladrey, Inc., Graduate School of Business, University of Chicago. Autumn 1999, Spring 2001, Spring 2002.

**Research/Seminar Presentations:**

ABA Section of Antitrust Spring Meeting, Washington DC.

American Economic Association (4)

American Finance Association (2)

American Institute for Economic Research

Boston University, Department of Economics (2)

Brigham Young University Department of Economics

Brown University Department of Economics

Carnegie Mellon University GSIA (2)

Center for Research in Securities Prices, University of Chicago

Chief Executive Leadership Institute

Columbia University Business School (2)

Columbia University, Department of Economics (2)

Cornell University, Applied Economics and Management

Cornell University Business School

Cornell University Department of Economics

**EXHIBIT 1**

Dartmouth College, Tuck School of Business (2)  
Dartmouth College, Department of Economics.  
Duke University, Department of Economics(2)  
Duke University, Fuqua School of Business (2)  
Econometric Society Winter Meetings  
Federal Reserve Bank of New York  
Free University of Brussels  
Georgia Finance Forum  
Harvard Business School (2)  
Harvard University Department of Economics (3)  
Harvard University, Kennedy School of Government  
Harvard University Law School  
International Industrial Organization Society (2)  
Johns Hopkins University, Department of Economics  
London School of Economics  
Massachusetts Institute of Technology, Economics Department (4)  
Massachusetts Institute of Technology, Sloan School of Management (2)  
Milton Friedman Institute, University of Chicago.  
National Bureau of Economic Research, Corporate Finance Group (3)  
National Bureau of Economic Research, Economics of Digitization Group (2)  
National Bureau of Economic Research, Ecommerce Group.  
National Bureau of Economic Research, Economic Fluctuations (2)  
National Bureau of Economic Research, Industrial Organization Group (5)  
National Bureau of Economic Research, Monetary Economics Group (2)  
New York University, Stern School of Business (3)  
Northwestern University, Kellogg School of Business (3)  
Northwestern University, Department of Economics  
Ohio State University, Department of Economics (2)  
Princeton University, Department of Economics and Woodrow Wilson School (2)  
Purdue University, Department of Economics  
QME Conference  
Rutgers University, Department of Finance  
Stanford University, Graduate School of Business (4)  
Tel Aviv University  
Texas A&M University, Department of Economics  
U. des Sciences Sociales (Toulouse, France)  
United States Department of Justice (3)  
United States Federal Communications Commission  
United States Federal Trade Commission (2)  
University of Arizona, Finance Department  
University of British Columbia, Summer industrial organization meeting  
University of California at Berkeley, Haas School of Business (5)  
University of California at Berkeley, Department of Economics  
University of California at Los Angeles, Department of Economics  
University of Chicago, Graduate School of Business (5)  
University of Connecticut, Department of Agricultural Economics  
University of Delaware, Department of Economics  
University of Florida, College of Business Administration  
University of Illinois, Department of Commerce and Business Administration (2)  
University of Illinois at Chicago, Finance Department.

**EXHIBIT 1**

University of Indiana, Business School (2)  
University of Maryland, College of Business and Management  
University of Maryland, Department of Economics  
University of Michigan, Department of Economics (2)  
University of Michigan, School of Business Administration (2)  
University of Minnesota, Department of Economics  
University of Notre Dame, College of Business  
University of Oregon, College of Business Administration  
University of Pennsylvania, Wharton School (2)  
University of Rochester, Simon School of Business  
University of Southern California, School of Law  
University of Toronto, Department of Economics  
University of Wisconsin, Department of Economics  
Washington University in St. Louis  
Yale University, Department of Economics (3)  
Yale University, School of Management (5)  
Yale University, Law School (2)

**Non-academic positions:**

Board member, the Foote School, 2005-present. Co-Treasurer and Chair of Audit Committee, 2006- 2008. Treasurer and Chair of Finance Committee, 2009-present.

**Submitted Expert Reports and Testimony:**

1. United States District Court, Southern District of Ohio  
The Procter & Gamble Company v. The Coca-Cola Company, 1:02CV393  
Report
2. American Arbitration Association  
SESAC, Inc. v. Television Music License Committee, No. 13 133 01583 05  
Report and testimony
3. United States District Court, District of New Hampshire  
Presstek, Inc. v. Creo, Inc., Civil Action No. 05-CV-65-PB  
Report and testimony
4. United States District Court, District of Delaware  
Advanced Micro Devices, Inc., et al. v. Intel Corporation, et al., Civil Action No. 05-441-JJF  
Report
5. United States District Court, District of Delaware  
State of New York by Attorney General Eric T. Schneiderman, v. Intel Corporation, Case No. 09-827 (LPS)  
Report and testimony
6. United States District Court, Southern District of Delaware  
The Authors Guild Inc, et. al. v. Google Inc, Civil Action No. 05-CV-8136(DC)  
Report and testimony

**EXHIBIT 1**

7. United States District Court, Northern District of California  
Apple Inc. v. Samsung Electronics Co., LTD., et al., Civil Action No. 12-CV-00630-  
LHK (PSG)  
Report and testimony